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Panel with Hidden Attachment Means

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ABSTRACT

A panel comprising a plurality of first members disposed in a first direction, at least some said first members defining a first part of a passageway, at least one second member disposed in a second direction and defining a second part of the passageway, the second member having a plurality of openings for at least partially receiving a said first member, and at least one elongate locking member, adapted to pass through the passageway, and substantially in alignment with the first member or the second member to lock the first member relative to the second member.

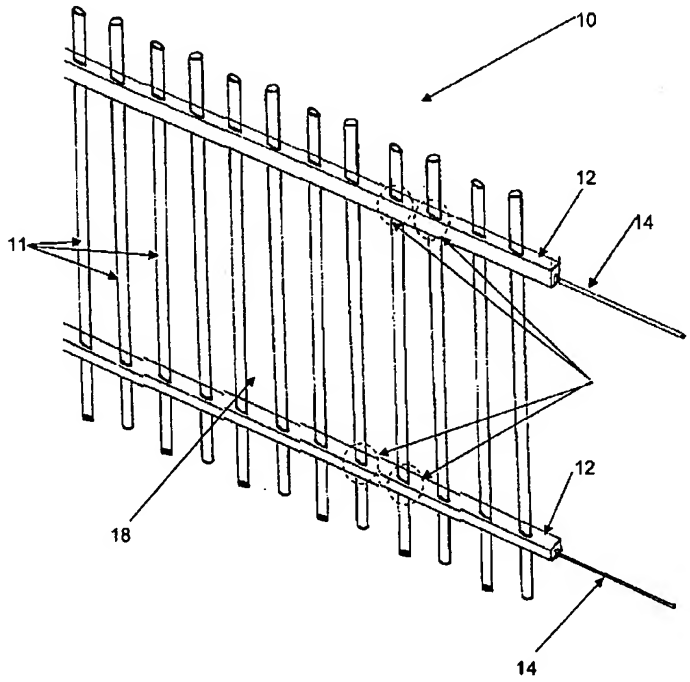

Figure 2

PANEL WITH HIDDEN ATTACHMENT MEANS

FIELD OF THE INVENTION

The present invention relates to panels and attachment means for attaching one member to another and in particular to an improved style of construction for lattice, fencing, roofing, awnings and the like.

BACKGROUND ART

Lattice, fencing, roofing, and awning structures are very popular and are used for many purposes. They are generally required to combine desirable characteristics of strength, light weight, and low cost. A typical fence structure for example, is formed from straight elements such as paling elements arranged in a generally vertical direction with one or more generally horizontal rail elements in a crossing pattern and fastened together, forming openings between the palings, but preventing entry or exit of anything larger than the opening dimension.

The conventional fence structure typically has two horizontal rail elements to make the overall structure stronger, and they are attached to one or more spaced apart fence posts which are embedded in the ground. They are also used for joining with other fence portions to from the fence or divider.

By varying structural dimensions and relationships in the assembly of a conventional fence structure, the style and security provided by the fence may be varied. For example, fences may be formed in a loop-top, flat-top or spike-top pattern by using different shaped palings. The attachment of the palings to the horizontal elements form regular and repeatable openings due to the spacing of the palings.

Conventional fence structures are generally formed of straight vertical elements, or slats, and perpendicular spacing elements. Although these structures have many uses, the geometry is not pleasing to everyone, and the use of such structures is thus somewhat limited. The vertical elements may be simple elongate post-like members or they may be U-shaped members in order to provide the loop-top fence. These may have a different appeal and be more aesthetically pleasing to some consumers.

In construction of conventional fences in particular, the palings of the vertical direction are generally disposed over the rails and attached thereto. Therefore they are generally wider than the thickness of a single member. These are generally fixed to one another using a fastener of some kind, usually nails, screws or staples.

For metal fencing, welding or a similar process may be used.

The areas where the palings and rails overlap are also sometimes provided with a rebated portion allowing the slats to fit together forming a structure having a single slat thickness. Rebating however generally only works well with wooden constructions, metal being difficult to apply a rebate to.

Both the method of using fasteners and the provision of rebates weaken the fencing structure. They provide points of weakness about which the palings in particular may splinter.

Fences formed in the usual ways also tend to sag when not supported or when the fence panel is larger. The weight of the palings and the entire fence panel bears on the fasteners and the rebates and may affect the strength or integrity of the fence. For this reason, these types of fences are unsuitable for use in security situations, particularly in situations such as pool fences.

Fences may also be manufactured using a preformed panel often made using a plastic sheet with the fence pattern of rails and palings stamped out of the sheet. Fencing formed in this manner is quite thin, as it must be pressed out by a machine while the plastic is still cooling after the sheet is extruded. This type of plastic lattice is usually weaker and may be used for ornamental applications. It is generally unsuitable for security situations and also tends to sag.

The most common materials used in the construction of fence panels are wood, plastic and light metals such as aluminium. Wood has many disadvantages, such as being relatively heavy for a given strength, as well as splitting and breaking under impact. Furthermore, wood will tend to rot and decay under most conditions and must be protected either by a preservative finish using an expensive chemical treatment or else painted with appropriate decorative finishes which must be reapplied periodically. Thus the complete cost of a wood fence is not only the original cost of erecting it, but also the continuing cost of maintenance and repair.

In order to overcome the problems with wood as a fencing material, a number of substitutes have been proposed, particularly plastics, and of these polyvinyl chloride or PVC has been one of the most popular. PVC has the advantages of easy fabrication by extrusion, molding and other processes, as well as reasonable cost and durability, since it can easily be coated with the necessary protective and finishing materials. PVC is however generally weaker than metals.

Aluminium is also used in construction and is used in security fencing such as pool fences. These constructions are often riveted together and the rivets therefore offer points of weakness about which the fence may bend.

OBJECT OF THE INVENTION

The present invention is directed to a panel with hidden attachment means, which may at least partially overcome the abovementioned disadvantages or provide the consumer with a useful or commercial choice.

In one form, the invention resides in a panel comprising a plurality of first members disposed in a first direction, at least some said first members defining a first part of a passageway, at least one second member disposed in a second direction and defining a second part of the passageway, the second member having a plurality of openings for at least partially receiving a said first member, and at least one elongate locking member, adapted to pass through the passageway, and substantially in alignment with the first member or the second member to lock the first member relative to the second member.

In use, the first members are positioned through the second members. The locking member may then be forced through the passage formed between them. In one form the part of the passageway defined by the first member may be a wall of at least some said first members and the part of the passageway defined by the second member may be a wall of the second member. The locking member may suitably be disposed between the walls of the first members and the second member and lock them relative to each other by a friction or interference fit.

In an alternative embodiment, the first members may be provided with a depression defining part of the passageway. The part of the passageway defined by the first member may be a depression in at least some said first members and the part of the passageway defined by the second member may be a wall of the second member. The depressions on first members may be aligned to allow the locking member. The locking member may engage with the depression on the first members and the wall of the second member to lock the members relative to each other.

In this manner, the attachment means may be inside the second members and is therefore hidden from sight. These embodiments may not be completely suitable for security panels as there may be some small degree of movement of the second members allowed if a significant force is applied to the

second member. The opening on the passage portions allows the locking member to be manipulated when forcing it through the passage portions in order to adjust the alignment of the locking member.

According to a particularly preferred embodiment, the invention resides in a panel comprising a plurality of first members disposed in a first direction, at least some said first members defining a first part of a passageway in the form of an opening, at least one second member disposed in a second direction and defining a second part of the passageway, the at least one second member having a plurality of openings therein, each opening in the at least one second member for at least partially receiving a first member, the second member including at least one passage portion, and at least one elongate locking member, wherein the at least one elongate locking member passes through the at least one passage portion and through the opening in the first member to attach the first member relative to the at least one second member.

Preferably, each at least one passage portion has a periphery which extends substantially about the at least one elongate locking member, when assembled, with at least one opening in a wall of the periphery to allow adjustment to the at least one locking member as it passes through the passage portion. The passage may act to align the elongate locking member with the openings in the first members.

In use, the first members are positioned through the second members and the openings in the first members are aligned with each other and the periphery of the passage portions. The locking member may then be forced through the passage portions and the openings in the first members, locking the first members to the second members. The attachment means is inside the second members and is therefore hidden from sight. The opening on the passage portions allows the locking member to be manipulated when forcing it through the passage portions in order to adjust the alignment of the locking member.

Panels may be formed in this manner without rivets or other fasteners. The panel is also less likely to sag under its own weight. The removal of the overlapping slats results in a slimmer panel which may be used in security situations as doors or window panels or in a larger form as a fence or wall panel. Depending upon the shape of the first and second members, the panel may also be used a roof, or awning.

There will suitably be more than one second member disposed in the

second direction. The plurality of first members will preferably take the form of paling members disposed on one direction and the second members will suitably be disposed in a second direction to form a network. The first members and the at least one second member will typically be oriented approximately perpendicular to each other and the network will therefore preferably have a cross-like appearance.

Each first member may preferably be an elongate strip member. The members may of course be of any cross-section required by a user or manufacturer of the panels. For example, a round member may be preferred by a consumer for aesthetic reasons or to reduce the appearance of the panel as a two-dimensional panel. The members may preferably not be rectangular or other shape possessing sharp corners or apices as these could weaken the overall structure of the panel. Members of these shapes may however be used in some situations. It is also anticipated that the first member may take on a foil shape, being substantially oval in cross-section but having flattened sidewalls.

The material used for construction of the each of the members may preferably be a light but strong metal such as aluminium. This will suitably provide the panel with the strength required to be used in security situations but remain light and slimmer in appearance than heavier or denser materials.

The shape of the network of members may be of any shape required by a consumer. Such shapes may be rectangular in appearance, but it may also be diamond shaped (or angled to the horizontal), or rounded in appearance. The shape of the panel and the network may also be abstract or freeform.

The arrangement of the network itself may preferably be an orderly array of members with the intersection of each first member with a second member providing a fixture point where the locking member attaches the first member to the second member. The fixture points may suitably be arranged in any two or three-dimensional pattern. Such pattern may be regular or abstract.

By varying structural dimensions and relationships in the assembly of the panel network, the relative area of any openings between the first members may be varied. The spacing of the members in the present invention may preferably be such that the openings are large enough to allow an unobstructed view or passage of air but small enough to provide security when necessary.

The openings in the panel may suitably be of any shape also, and will

preferably be related to the array of the network.

The size of the panel may be varied to suit the application to which the panel is to be put. For example, when used as a fence, the panel will preferably be between 0.9 and 3 meters in height and 0.5 to 3 meters in width. More than one panel may be used to form a fence. When used in other situations, the panel will be suitably sized in order to achieve its purpose.

Each first member may preferably be round, rectangular or substantially oval in cross-sectional shape. It may also preferably have a cross-sectional shape having two substantially linear, parallel sidewalls and two arcuate end walls.

Each first member may preferably be extruded. The extrusion may be of any length required. It is anticipated that U-shaped first members may be used to form a loop-top fence.

Each first member may have any dimensions, but preferably may be between approximately 1 cm and 10 cm in width, and any length.

Each first member preferably may be tubular in construction. The tubular construction will preferably provide strength and rigidity to the panel but not add excessive weight to the construction. However, a solid construction may preferably be used in specific situations.

Each first member has at least one opening therethrough and the opening may be in the form of a passage disposed through it. There may be a plurality of passages. The passages in adjacent first members may suitably be coaxial. Each passage may preferably approximate the size and/or shape of the exterior of the elongate locking member. The passage will preferably be sized to provide an interference fit with the elongate locking member. The interference fit may be a tight interference fit or a loose interference fit.

The passages are suitably shaped to receive the elongate locking member in a way that the elongate locking member may be pushed through the passages in adjacent first members without the use or a hammer or like device. The passage may suitably be sized to firmly grip the elongate locking member but not to deform the elongate locking member when it passes through said passage.

The wall thickness of each first member will preferably be similar and be between approximately 0.5 mm and 10 mm. Thicker walls may be provided for

members in larger panels, as those members will have to support a greater weight.

Each second member may preferably be substantially rectangular in cross-sectional shape. The passage portions may preferably be disposed within the rectangular cross-section of the second member.

Each second member may preferably be extruded. The extrusion may be of any length required.

Each second member may have any suitable dimensions, but preferably may be between approximately 1 cm and 10 cm in a first direction, 1 mm to 10 cm in a second direction and of any suitable length.

Each second member may be solid, but preferably will be tubular in construction, with the passage portions dispose within the hollow interior. The tubular construction will preferably provide strength and rigidity to the panel but not add excessive weight to the construction. Solid construction may preferably be used in specific situations.

Each second member also has at a plurality of openings disposed through it to receive the first members. These openings may be passages and are suitably spaced along each second member. The wall thickness of each second member will preferably be similar and be between approximately 0.5 mm and 10 mm. Thicker walls may be provided for members in larger panels, as those members will have to support a greater weight.

Each second member is preferably disposed substantially perpendicular to the first members to form a two-dimensional panel.

The locking member may preferably be extruded in a continuous manner and cut to length. It may be of any shape but is preferably shaped to correspond to the shape of the passageway. The locking member may have an at least partially conical or tapered end in order to make driving the member into the passageway easier. The locking member may suitably be of a constant cross-section over its length. It may include at least one protruding section to allow engagement with the opening in the periphery of the passageway. This may give the locking member a keying function and assist with the alignment of the locking member with the passageway.

As may be appreciated, the invention is described herein with particular reference to a fence panel. It is to be appreciated that the invention may apply equally

to an awning or a roof structure as well. Other applications may become evident upon further explanation of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the invention will be described with reference to the following drawings, in which:

Figure 1 shows a sectional view of a second member with locking member in place according to an aspect of the present invention.

Figure 3 shows a sectional view of a frame member.

BEST MODE

In one broad form, the present invention provides a panel 10 with hidden attachment means, the panel 10 comprising a plurality of first members 11 disposed in a first direction, each having at least one opening therethrough, at least one second member 12 disposed in a second direction having a plurality of openings therein, each opening in the at least one second member 12 for at least partially receiving a first member 11, the second member 12 including at least one passage portion 13, and at least one elongate locking member 14, wherein the at least one elongate locking member 14 passes through the at least one passage portion 13 and through the opening in each first member 11 to attach each first member 11 to the at least one second member 12.

Each at least one passage portion 13 has a periphery 15 which extends substantially about the at least one elongate locking member 14, when assembled, with at least one opening 16 in a wall of the periphery 15 to allow adjustment to the locking member 14 as it passes through the passage portion 13. The opening 16 in the passage portion 13 can be used to align the elongate locking member 14 with the openings in the first members 11.

As illustrated in Figure 2, the invention can be put in effect in a fence panel. There is a plurality of first members 11 disposed in a substantially vertical direction. The plurality of first members 11 are disposed in a substantially vertical direction and there are two second members 12 disposed in a second direction, perpendicular to the first direction to form a network. The network has the appearance of a fence.

Each first member 11 is a paling member. The first members 11 are manufactured from aluminium. This provides the panel with the strength required to

be used in security situations but remain light and slimmer in appearance than heavier or denser materials.

The arrangement of the panel illustrated is an orderly array of first members 11 with the intersection of each first member 11 with a second member 12 providing a fixture point 17. The fixture points 17 are arranged in a two-dimensional pattern as a rectangular fence.

The spacing of the first members 11 shown are such that the openings 18 between them are large enough to allow an unobstructed view or passage of air but small enough to provide security.

Each first member 11 is substantially round in cross-sectional shape. Each first member 11 is tubular in construction. The tubular construction will preferably provide strength and rigidity to the panel but not add excessive weight to the construction.

Each first member 12 is extruded. The length of the extrudate is related to the height of the panel to be formed.

Each first member 12 is between approximately 1 to 2 cm in diameter.

Each first member 11 has two passages disposed through it. Each passage has a periphery that extends around each elongate locking member 14. The passages of adjacent first members 11 are coaxial to allow the panel to be formed. The passages provide an interference fit with the exterior surface of the second members 13.

The wall thickness of each first member 11 is between approximately 0.5 mm and 10 mm.

Each second member 12 is manufactured of similar materials and in a similar way to each first member 11.

Each second member 12 is substantially rectangular in cross-sectional shape. The passage portions 13 are disposed within the rectangular cross-section of the second member 12.

Each second member 12 is extruded in any length required. Each second member is between approximately 1 cm and 10 cm in a first direction, 1 mm to 10 cm in a second direction and of any suitable length.

Each second member 12 is preferably will be tubular in construction, with the passage portions 13 disposed within the hollow interior. The tubular

construction provides strength and rigidity to the panel but not add excessive weight to the construction. Solid construction may only be used in specific situations.

Each second member 12 also has at a plurality of openings disposed through it to receive the first members 11. These openings are passages and are spaced along each second member. The wall thickness of each second member will preferably be similar to the first members and is between approximately 0.5 mm and 10 mm. Thicker walls may be provided for members in larger panels, as those members will have to support a greater weight.

Each second member 12 is disposed substantially perpendicular to the first members to form a two-dimensional panel.

In use, the first members are positioned through the second members and the openings in the first members are aligned with each other and the periphery of the passage portions. The locking member is then forced through the passage portions and the openings in the first members, locking the first members to the second members. The attachment means is inside the second members and is therefore hidden from sight. The opening on the passage portions allows the locking member to be manipulated when forcing it through the passage portions in order to adjust the alignment of the locking member.

In the present specification and claims, the word "comprising" and its derivatives including "comprises" and "comprise" include each of the stated integers but does not exclude the inclusion of one or more further integers.

In compliance with the statute, the invention has been described in language more or less specific to structural or methodical features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted by those skilled in the art.

CLAIMS:

1. A panel comprising a plurality of first members disposed in a first direction, at least some said first members defining a first part of a passageway, at least one second member disposed in a second direction and includes at least one passage portion defining a second part of the passageway, the second member having a plurality of openings for at least partially receiving a said first member, and at least one elongate locking member, adapted to pass through the passageway, and substantially in alignment with the first member or the second member to lock the first member relative to the second member, wherein each at least one passage portion has a periphery which extends at least partially about the at least one elongate locking member, when assembled, with at least one opening in a wall of the periphery to allow adjustment to the at least one locking member as it passes through the at least one passage portion.

2. A panel as claimed in claim 1 wherein the part of the passageway defined by the at least some said first members is defined by an opening, and the second member includes at least one passage portion defining a second part of the passageway, wherein the at least one elongate locking member passes through the at least one passage portion and through the opening in the first members to attach each first member relative to the at least one second member.

3. The panel according to claim 2 wherein the at least one opening in a wall of the periphery is a gap extending substantially the length of the second member.

4. The panel according to any one of the preceding claims, comprising more than one second member disposed in the second direction.

5. The panel according to any one of the preceding claims wherein the cross-sectional shape of the first member is chosen from the group consisting of round, foil, oval, rectangular or other shape.

6. The panel according to any one of the preceding claims wherein each of the members is manufactured from metal or plastics material.

7. The panel according to any one of the preceding claims wherein the panel is an orderly array of members with the intersection of each first member with a second member providing a fixture point where the locking member attaches the first member relative to the second member.

8. The panel according to any one of the preceding claims wherein the part of the

passageway defined by the first member is an opening in the form of a passage and the passages in adjacent first members are coaxial.

9. The panel according to claim 8 wherein each passage is sized to provide an interference fit with the elongate locking member.

10. The panel according to any one of the preceding claims wherein each second member is substantially rectangular in cross-sectional shape and tubular in construction, and the part of the passageway defined by the second member is inside the second member.

11. The panel according to any one of the preceding claims wherein the panel is part of a fence, awing or roof structure.

12. The panel according to claim 1 wherein the part of the passageway defined by the first member is a depression in at least some said first members and the part of the passageway defined by the second member is a wall of the second member.

13. The panel according to claim 1 wherein the part of the passageway defined by the first member is a wall of at least some said first members and the part of the passageway defined by the second member is a wall of the second member.

14. A panel substantially as described herein with reference to the accompanying drawings.

DATED this 29th day of January 2004

Alan BROWNBILL

By his Patent Attorneys

CULLEN & CO.

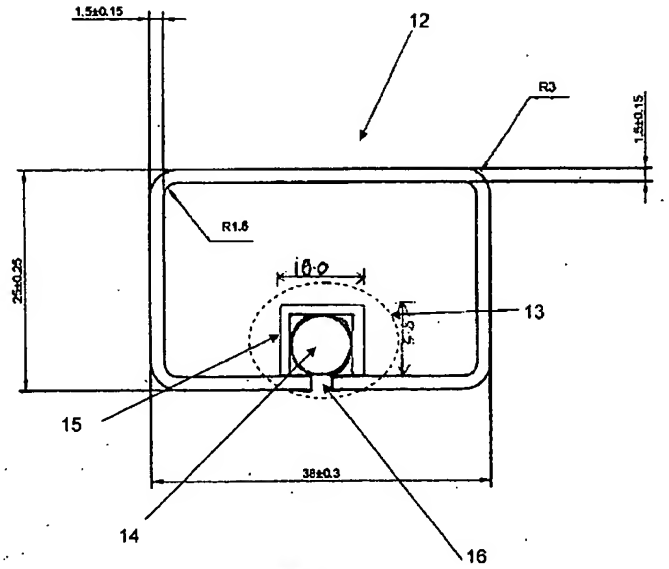

Figure 1

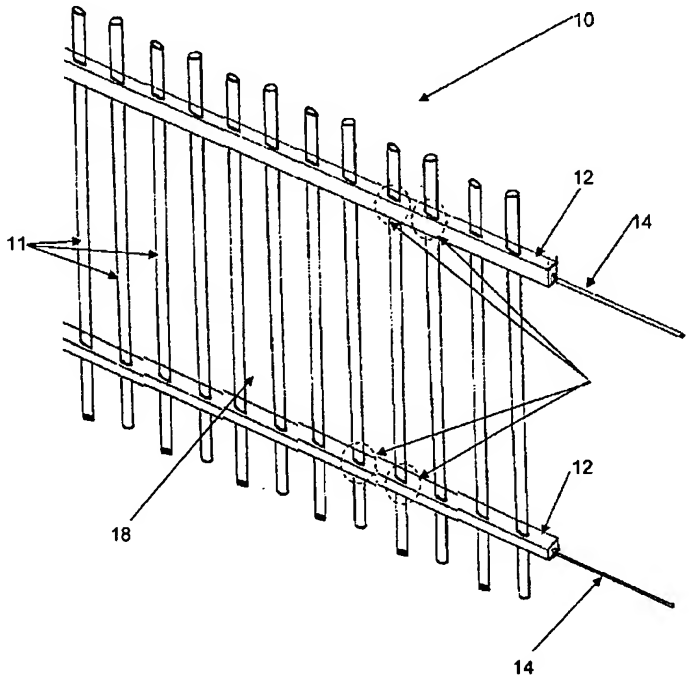

Figure 2